RESEARCH NOTE

POLITICAL BUSINESS CYCLES, PRESIDENTIAL ELECTIONS, AND SUICIDE AND MORTALITY PATTERNS*

IRA M. WASSERMAN
Eastern Michigan University

Recent works by Phillips and Feldman, and Boor have shown that mortality and suicide rates drop significantly during presidential elections, a phenomenon the previous authors titled the presidential death dip. This work argues that the previous studies are flawed both methodologically and theoretically. By comparing suicide and mortality rates in presidential election years with rates in adjacent years the studies fail to examine all the information in their data set, and consequently are unable to control for other relevant variables. In particular, other studies have shown that the unemployment rate is significantly related to the suicide and mortality rates, and the rate of unemployment tends to be relatively low in September and October of presidential election years. Employing monthly suicide and mortality data between 1903 and 1977, and using multivariate time-series analysis, it is found that when variations in the unemployment rate are controlled no significant relationship exists between presidential elections and suicide and mortality rates. The results of this study demonstrate that the presidential death-dip hypothesis is incorrect.

Since Durkheim's ([1897] 1951) classic study of suicide there has been an ongoing concern with replicating and extending his analysis. Two major explanatory variables for Durkheim are integration and regulation (Pope, 1976:12–13). Integration levels in society determine how strongly the individual egos are linked to the collective order. When the level of integration is weak, a type of suicide Durkheim termed egoistic is more likely to occur. In regard to this type of suicide Durkheim ([1897] 1951:202–208, 241–46) argued that political crises and war tend to increase the level of social integration, which reduces the level of egoism and thereby decreases the suicide rate. However, a recent study relating war to variations in the suicide rate for the United States between 1933 and 1976 (Marshall, 1981) found that the effect of war on suicide was mediated by changing economic activity linked with war; and controlling for variations in the yearly unemployment rate removed the war effect. Regulation involves the control of society over the individual social actor, and when this regulation is low the level of social anomie increases, which in turn increases the suicide level in society. Economic crises (e.g., recessions, depressions) increase the level of anomie in society, which increases the suicide rate.

A recent innovative attempt to apply Durkheim's perspective may be seen in Phillips and Feldman's (1973) study of the impact of presidential elections on mortality rates in the United States during September and October of presidential election years in relation to their levels before and after these years. They found, consistent with Durkheim's ([1897] 1951) findings, that during presidential election years there was a death dip resulting from the higher level of social integration during these years. Similarly, Boor (1981) analyzed suicide data and found a significant dip in suicide levels during presidential election years.

There has also been a concern with this question in the psychological literature. Lester (1973) examined the relationship between national suicide and measures of national stability and found no significant linkage between the two factors. Andress and Carey (1979) examined suicide data for Riverside County, California, between 1960 and 1974 using yearly suicide data, and argued that presidential campaigns caused an increase in suicide rates, a

*Direct all correspondence to: Ira M. Wasserman, Department of Sociology, Eastern Michigan University, Ypsilanti, MI 48197.

The author would like to thank Stanley Engerman for offering helpful suggestions regarding the formulation of the time-series model, Myron Boor for supplying him with his original data for mortality and suicide frequencies by month, Raouf Hanna for giving him the computer program that is employed in the analysis, and anonymous reviewers of the journal for offering helpful advice regarding theoretical and methodological issues. Naturally none of these scholars is responsible for any faults in this work.

finding flawed by the fact that the time period of the presidential campaigns was not precisely defined. Schulz and Bazerman (1980) reexamined the presidential death-dip hypothesis using the data employed by Phillips and Feldman (1973). They considered the relationship between the magnitude changes in the death dip and the importance of the presidential election, as measured by voter turnout, finding no significant correlation between the two factors. None of these studies statistically disproved the death dip hypothesis or offered alternative explanations for it.

The basic contention of this paper is that the presidential death-dip hypothesis is incorrect because of methodological flaws in the mode of analysis which prevent the control of economic factors that vary appreciably during September and October of presidential election years and also have a significant impact on the suicide and mortality rates. The relative suicide and mortality rates employed in the cited studies cannot be used to determine whether there was an absolute decrease in the mortality and suicide rates during September and October of presidential election years. The measures compute the relative rate of mortality and suicide in presidential election years, and then compare the computed rate with the average rate in years prior to presidential elections and after presidential elections. However, if in some presidential election years the overall rate of mortality or suicide is higher than in adjacent years, it is possible that the relative rate for September and October might decrease in relation to the adjacent years, while the average absolute rate would be higher than the average absolute rate for adjacent years. For example, in 1939 the relative mortality rate for September and October was .1526, while in 1941 it was .1509, so that the average rate for 1939 and 1941 was .1518. The relative rate in 1940 was .1509, indicating a relative death dip of .0009 for this time period. By contrast, in 1939 the average monthly mortality rate was 80.75 per 100,000, while in 1941 it was 78.20 per 100,000, yielding an average value for the two years of 79.48 per 100,000. However, in 1940 the average monthly rate in September and October was 80.47 per 100,000, indicating a death rise of 0.99 per 100,000 for this time period. The statistical measure employed in previous analysis does not allow the investigator to control for within-year variations in mortality and suicide rates and represents an inappropriate technique for standardizing the data and determining whether mortality and suicide rates fall during September and October of presidential election years.

A related limitation with the previous analyses is their inability to control for other factors that might vary significantly during September and October of presidential election years and might simultaneously influence the suicide and mortality rates. There is empirical evidence that unemployment rates are relatively lower during September and October of presidential election years, while at the same time other studies have shown that variations in monthly unemployment rates significantly influence the monthly suicide and mortality rates.

POLITICAL BUSINESS CYCLES

The theory of political business cycles can be understood within the framework of Downs's (1957) classic study of political behavior, in which he argued that governments in modern democracies must be viewed as entrepreneurs that sell policies for votes. It is likely that this entrepreneurship will be greater as presidential elections approach than at other time periods (Lindbeck, 1976:11). Nordhaus (1975) formalized the model in relation to the unemployment rate, hypothesizing that in democratic societies the unemployment rate would be lower in the later period of an incumbent's term. Testing the hypothesis for nine nations between 1947 and 1972 using annual national data, he found the hypothesis to be valid for the United States and two other nations. Other studies also lend support to the hypothesis. Schumpeter (1939:391) found that the American economy experienced a violent rise in the fourth quarter of 1936, while for the 1972 presidential election the Nixon administration jettisoned the policy of economic restraint in order to stimulate an election year boom (Hibbs, 1977, 1979). Tufte (1978) examined monthly unemployment data between 1948 and 1976 and found that it usually reached its minimum values over the four-year cycle in the months prior to presidential elections. In summary, the theory of political business cycles argues that American presidents develop a strategy of employing macroeconomic policies to maximize their votes during the period of presidential elections (Hibbs, 1982).

Political business cycles are relevant to this analysis because other studies have shown that variations in the national unemployment rate have a significant impact on the national mortality and suicide rates. With regard to changes in the mortality rate over time, a number of studies (Brenner, 1971, 1976, 1979; Land and Felson, 1977:349; Land and McMillen, 1980:28) have statistically demonstrated that yearly changes in the unemployment rate significantly affect the total mortality rate, and specifically the cardiovascular mortality rate. In regard to suicide, a number of cross-

sectional (Boor, 1980) and longitudinal (Henry and Short, 1954; Hamermesh, 1974; Hamermesh and Soss, 1974; Vigderhaus, 1977; Brenner, 1979) studies which employed regional and national data found significant linkage between the two variables.

One can hypothesize that the findings linking suicide and mortality to the timing of presidential elections might be caused by the fact that unemployment rates are low in that time period because the entrepreneurial state managers attempt to heat-up the economy and drive down the unemployment rate. According to this theory, presidential electoral politics leads to a political interference in the business cycle, which causes a relative decrease in the unemployment rate in September and October of presidential election years. Since the unemployment rate is causally linked with the suicide and mortality rates, this hypothesized linkage should cause a direct negative relationship between presidential elections and the suicide and mortality rates. In order to determine whether the timing of presidential elections significantly influences suicide and mortality, it is necessary to control for the increased economic activity generated by the state managers during this time period.

METHODOLOGY

This study develops a multivariate time-series model to examine the previous hypothesis, treating the monthly mortality and suicide rates as the dependent variables. Employing government data sources (U.S. Bureau of the Census, 1903–1936; U.S. Public Health Service, 1937–1977), it is possible to obtain information on the number of deaths in the United States for each month between 1903 and 1977, and the number of monthly suicides for 1910 to 1920 and 1924 to 1977.[1] In order to obtain the monthly rates for the two variables, the total United States population for each month in the time period was estimated by means of a linear interpolation formula,[2] and the monthly mortality and suicide rates were then computed,[3] the monthly mortality rate being standardized per 100,000 and the monthly suicide rate per one million population.

In order to measure the effect of presidential elections on the two dependent variables, two dummy variables are created. If a month is September or October of a presidential election year, it is given a score of 1, and 0 otherwise.

Although a recent study for the United States between 1933 and 1976 (Marshall, 1981) showed that wars have no effect on the suicide rate once unemployment is controlled, it is possible that this study is in error because it employed yearly rather than monthly suicide data. In the present analysis a war dummy variable is created, where if a particular month occurs during a war,[4] it is coded 1, and 0 otherwise.

The monthly unemployment rate was determined from government statistics between 1948 and 1977 (Bureau of Labor Statistics, 1948–1977). Although the monthly unemployment rate is unavailable prior to 1948, a surrogate measure—the Ayres business activity index (Ayres, 1939)—is available for the period 1903 to 1939. The index is a composite monthly measure of manufacturing production. For the period 1903 to 1919 the Thomas index of manufacturing, with mineral production added, was used to construct the index. For 1919 to 1939 the monthly figures of the Federal Reserve (Thomas) index of industrial production were used (Ayres, 1939:204). The index possesses a face validity since its value drops significantly during historic periods of economic downturn (e.g., 1920 through 1921, 1929 through 1939). It will be assumed that this monthly measure is inversely related to the monthly unemployment rate (i.e., a monthly fall in the Ayres index will immediately lead to a monthly rise in the unemployment rate).

In relating unemployment and the Ayres production index to the two dependent variables it is necessary to consider lag effects: unemployment may rise sharply in a particular

[1] Monthly suicides were not determined by the United States government between 1920 and 1923.

[2] For example, in April of 1950 the United States population was 150,697,361, while in April of 1960 it was 179,323,175, a population growth of 28,625,814. The population in April of 1951, 1/10 of the time period between April of 1950 and 1960 is estimated as $150,697,361 + .10 \times 28,625,814 = 150,697,361 + 2,862,581 = 153,559,942$. Except for the late 1940s and early 1950s, when the nation experienced a baby boom after World War II, this first-order estimation should be reasonably accurate.

[3] Between October of 1918 and March of 1919 it was necessary to correct the mortality rate statistics due to the effect of the Great Influenza epidemic of 1918–1919, which caused mortality rates to increase appreciably beyond their normal values. For these months the computed mortality rates per 100,000 were replaced by the average rates for these months over the whole time period from 1903 to 1977. For example, the computed October 1918 rate of 279.2 per 100,000 was replaced by 79.25 per 100,000, the average rate for all Octobers in the time period between 1903 and 1977.

[4] The war months were between April of 1917 and November of 1918 (World War I), December of 1941 and August of 1945 (World War II), July of 1950 and July of 1953 (the Korean War), and July of 1965 and January of 1973 (the Vietnam War).

time period, but it may take a number of months before this rise has an impact on the mortality or suicide rate. In order to lag unemployment and the Ayres production index, a technique developed by Almon (1965), which approximates the lag weights with a polynomial of suitable degree, is used. Ostrom and Hoole (1978) have illustrated how the Almon (1965) method can be used to determine the lag terms.

In employing the Almon (1965) method, two methodological questions that must be considered are the degree of the polynomial and the number of lag terms to be employed in the model. Gujarati (1978:275–76) has shown that the degree of the polynomial can be determined by an iterative process that compares the significance of the coefficients of the transformed Z values. For example, if one uses a second-degree polynomial for the technique and obtains significant coefficients for the transformed Z variable, but finds that the additional coefficients are not significant for the third-degree polynomial, one would employ a second-degree polynomial for the Almon technique.

The second question concerns the determination of the maximum length (k) of the lag terms. Unfortunately, for most time-series analyses the number of lag terms is determined by statistical, and not behavioral considerations. Since there are few studies in the literature that employ monthly data and specify the time lag between economic changes and mortality and suicide, this study used statistical considerations to determine the length of the lag. Specifically, a large number of lag terms are introduced into the multivariate time-series equation, and the t-statistic for the lag-term coefficients is examined to determine when it ceases to be significant. At the period when the t-statistic ceases to be significant, that lag term is set equal to zero, under the assumption that at some time period the lag terms cease to have any impact on the dependent variables.

In employing time-series analysis it is necessary to control for seasonal effects. With regard to the mortality data, an examination of the collected data shows the rate to be higher during the colder months and lower during the warmer months, probably due to the fact that in the United States more individuals are likely to die in colder months of acute illnesses (e.g., colds, flu, pneumonia). Similarly, Durkheim ([1897] 1951:119–22) showed the seasonal effects with regard to the suicide rate, with the rate in European countries being lower in the winter and higher in the spring. If one assumes as a first-order approximation that the seasonal effects are periodic, then one can employ dummy variables to represent the months.[5] Thus, eleven dummy variables are created to represent the seasonal effects, arbitrarily beginning in January and ending in November. If a month is the one specified, it is given a score of 1, and 0 otherwise.

In examining the relationship between the variables employed in the study,[6] it would be possible to employ ordinary least square (OLS) techniques if autocorrelation were not present. Hibbs (1974:270) has argued that if seasonal and cyclical effects are eliminated, a first-order estimate of the error terms can be employed. However, given the large number of time units in our data set due to the use of monthly data, the errors may not be governed by first-order autoregression. If autocorrelation is present, a second-order autoregression scheme is used, and the slope coefficients that are computed compared with the results from the first-order autoregression. Initial OLS was employed with the data to determine if autocorrelation is present, using the Durbin-Watson (D-W) autocorrelation test (Merrill and Fox, 1970:413–20, 589–91). In all cases the D-W statistic was less than 1.0, indicating that positive autocorrelation is present in the data set. The first- and second-order Cochrane-Orcutt Technique (Orcutt and Cochrane, 1949) was used to eliminate autocorrelation, and it was found that either formula produced quite similar slope coefficients. The first-order technique is usually employed in time-series studies, and is used in this study. The tables in the next section list the final D-W statistic and the computed ρ statistic (the final correlation between the error terms).

---

[5] Granger (1978:35–36) has shown that if the dependent variables involve a process with seasonal properties, the independent variables do not possess seasonal properties, and the seasonal effects are periodic, then one can approximate the seasonal effects with a series of dummy variables.

[6] The following codes were used to define the variables in the study: MORT=Monthly mortality rate; SUIC=Monthly suicide rate; PRS1=September of presidential election year; PRS2=October of presidential election year; JAN=January of a particular year; FEB=February of a particular year; MAR=March of a particular year; APR=April of a particular year; MAY=May of a particular year; JUN=June of a particular year; JUL=July of a particular year; AUG=August of a particular year; SEP=September of a particular year; OCT=October of a particular year; NOV=November of a particular year; WAR=War month; UNEMi=Unemployment rate (i=the time period of the unemployment rate, where i goes from 0 to n); AYRi=Ayres business production index (i=the time period of the production index, where i goes from 0 to n). The presidential election variables, the war variable, and the months are all dummy variables.

ANALYSIS OF RESULTS

Given the fragmented nature of the data set, it is necessary to examine the two dependent variables in stages. First, the suicide and mortality data are examined between 1948 and 1977 (the time period when monthly unemployment data is available), then the mortality data is examined between 1904 and 1937;[7] and the suicide data is examined for 1910 to 1920 and 1924 to 1939 due to the three-year gap in the monthly government suicide data. Examining the various degree approximations for the Almon (1965) method, it was found that in all cases the coefficients for the first-degree, but not for the second-degree, approximation were significant, and it was decided to employ a first-degree approximation for the Almon (1965) method. Intuitively, one might expect that the effect of initial unemployment on suicide and mortality would fall off linearly over time, rather than increasing to some maximum value(s) and then decreasing over time.

In order to determine the size of the lag effects, a large number (15) of lag terms are introduced into the regression equation, and the statistics are examined to determine their significance in relation to the two dependent variables. It was found that the lag terms were significant up to, but not including, 9 months for the suicide rate, and up to, but not including, 12 months for the mortality rate. In order to simplify the interpretation of the results, it was decided to place a zero restriction on the end point[8] and lag the suicide rate in all cases by 9 months, and the mortality rate in all cases by 12 months. Equation (1) indicates the model employed for relating the suicide rate to the independent variables between 1948 and 1977, where Bn is the sum of all the slope coefficients, ρ is the correlation between the first-order lagged error terms, and Wi's are the weights for the various lag terms.

$$\begin{aligned} \text{SUIC}t = {} & \text{Ao} + \text{A1} \times \text{PRS1} + \text{A2} \times \text{PRS2} \\ & + \text{A3} \times \text{JANt} + \text{A4} \times \text{FEBt} \\ & + \text{A5} \times \text{MARt} + \text{A6} \times \text{APRt} \\ & + \text{A7} \times \text{MAYt} + \text{A8} \times \text{JUNt} \\ & + \text{A9} \times \text{JULt} + \text{A10} \times \text{AUGt} \\ & + \text{A11} \times \text{SEPt} + \text{A12} \times \text{OCTt} \\ & + \text{A13} \times \text{NOVt} \\ & + \text{A14} \times \text{WARt} \\ & + \text{Bn} \sum_{i=0}^{9} \text{Wi} \times \text{UNEMt}-\text{i} \\ & + \rho \times \epsilon_{t-1} \end{aligned} \tag{1}$$

Table 1 indicates the values of the slope coefficients, the t-values, and the weight for the various time periods. The results in Table 1 lend support to the political business hypothesis—controlling for the influence of unemployment eliminates the relationship between presidential elections and the suicide rate. Consistent with other studies (e.g., Brenner, 1979), unemployment lagged over 9 months had a significant impact on the suicide rate, with 67 percent of its effect, as indicated by the weights, being felt three months after the shift in unemployment. The short-term impact of unemployment on suicide is consistent with Vigderhaus's (1977:42–43) findings, using yearly data, which showed that unemployment had an instantaneous impact on the suicide rate. Seasonal effects are present, and consistent with Durkheim's ([1897] 1951:119–22) findings, the rates are highest in March, April and May. The results in Table 1 are inconsistent with Marshall's (1981) findings on a war effect since they indicate that the Korean and Vietnam wars had an appreciable impact on the suicide rate after variation in the unemployment rate is controlled.

Equation (1) represents the model to be employed for the analysis of the mortality rate in the time period 1948 to 1977, replacing the suicide rate with the mortality rate. Table 2 indicates the estimate of the slope coefficients, the t-values, and the weights, lagged over a 12-month period. Presidential elections have no significant impact on the mortality rate. However, this result is not due to the effect of unemployment, since the unemployment rate lagged over 12 months has a significant but negative impact on the mortality rate, as shown by the sign of the slope coefficient and the t-statistic. The results imply that when unemployment increases there is a decrease in the overall mortality rate, a finding that contradicts

---

[7] The time-series program supplied to the author by Raouf Hanna has a computer limitation of 400 time elements. Since the mortality rate data between January of 1903 and July of 1939 involved 439 months, it was necessary to remove 39 months from the data set in order to employ the multiple autocorrelation program supplied by Professor Hanna. In order to determine how this elimination might affect the results, the author first removed the months between January of 1903 and March of 1906, then between May of 1936 and July of 1939, and finally between January of 1903 and December of 1903 and May of 1937 and July of 1939. For each of the three types of removals similar results were obtained. Since the study is concerned with the influence of presidential elections on the mortality rate, and since the removal of the few months from the data set does not seriously affect the final results, it was decided to remove the months from January of 1903 to December of 1903 and May of 1937 to July of 1939.

[8] The placing of this restriction on the endpoint of the lag terms causes all the t-values for the lag terms to be the same, and for this reason they are not reported in the tables.

Table 1. Slope Coefficients, t-Values, and Time-Lag Weights Relating the Suicide Rate to the Independent Variables between 1948 and 1977

Variables	Slope Coefficient Estimate	t-Values	Time Period for the Unemployment Rate	Slope Coefficient Estimate (Bi)	Weights Wi=Bi/Bn
Constant Term	6.59	23.29*	UNEM0	.079	0.20
PRS1	−.07	−.46	UNEM1	.070	0.18
PRS2	.03	.16	UNEM2	.061	0.16
JAN	.39	6.04*	UNEM3	.052	0.13
FEB	−.24	−2.43*	UNEM4	.044	0.11
MAR	1.03	9.35*	UNEM5	.035	0.09
APR	1.11	9.50*	UNEM6	.026	0.07
MAY	1.20	10.12*	UNEM7	.017	0.04
JUN	.57	4.65*	UNEM8	.009	0.02
JUL	.54	4.52*	UNEM9	.000	0.00
AUG	.51	4.42*			
SEP	.28	2.48*			
OCT	.50	4.81*			
NOV	.02	.25			
WAR	.46	3.81*			
$\sum_{i=0}^{9}$ UNEMt−i	.39	8.56*			
ρ		.650			
R^2 = .510 SE = .373 D-W = 2.024 df = 328					

* Significantly different from 0 at the .01 level.

Table 2. Slope Coefficients, t-Values, and Time-Lag Weights Relating the Mortality Rate to the Independent Variables between 1948 and 1977

Variables	Slope Coefficient Estimate	t-Values	Time Period for the Unemployment Rate	Slope Coefficient Estimate (Bi)	Weights Wi=Bi/Bn
Constant Term	88.90	45.92*	UNEM0	−.144	0.15
PRS1	−.48	−.49	UNEM1	−.132	0.14
PRS2	.16	.16	UNEM2	−.120	0.13
JAN	2.65	5.36*	UNEM3	−.108	0.12
FEB	−.588	−9.22*	UNEM4	−.096	0.10
MAR	−1.00	−1.40	UNEM5	−.084	0.09
APR	−7.02	−9.26*	UNEM6	−.072	0.08
MAY	−6.93	−8.88*	UNEM7	−.060	0.06
JUN	−9.83	−12.49*	UNEM8	−.048	0.05
JUL	−8.55	−10.96*	UNEM9	−.036	0.04
AUG	−11.05	−14.68*	UNEM10	−.024	0.03
SEP	−12.97	−17.40*	UNEM11	−.012	0.01
OCT	−7.07	−10.51*	UNEM12	0.00	0.00
NOV	−7.05	−14.46*			
WAR	0.58	.71			
$\sum_{i=0}^{9}$ UNEMt−i	−0.93	−2.90*			
ρ		.675			
R^2 = .807 SE = 2.409 D-W = 2.041 df = 325					

* Significantly different from 0 at the .01 level.

those of previous studies (e.g., Brenner, 1971, 1976). This anomalous finding is probably related to the size of the time unit of analysis in this study (i.e., months) and the time lag used in the study (i.e., 12 months), a period of time which may be insufficient for capturing the influence of unemployment on some of the principal components of the mortality rate.[9] The

[9] Brenner (1976:5–6) has shown that if one lags unemployment in relation to cardiovascular deaths by three to five years, it has a significant impact on the rate. In the post–World War II period cardiovascular deaths have typically made up 30 to 50% of all

Table 3. Slope Coefficients, t-Values, and Time-Lag Weights Relating the Suicide Rate to the Independent Variables between 1910 and 1920

Variables	Slope Coefficient Estimate	t-Values	Time Period for the Unemployment Rate	Slope Coefficient Estimate (Bi)	Weights Wi=Bi/Bn
Constant Term	7.52	34.54*	AYR0	−.0072	0.20
PRS1	.27	.77	AYR1	−.0064	0.18
PRS2	−.08	−.23	AYR2	−.0056	0.15
JAN	.41	2.20	AYR3	−.0048	0.13
FEB	.18	.76	AYR4	−.0040	0.11
MAR	1.38	5.29*	AYR5	−.0032	0.09
APR	1.72	6.22*	AYR6	−.0024	0.07
MAY	2.33	8.22*	AYR7	−.0016	0.04
JUN	1.73	6.05*	AYR8	−.0008	0.02
JUL	1.43	5.06*	AYR9	0.00	0.00
AUG	.92	3.34*			
SEP	.66	2.34			
OCT	.69	2.73*			
NOV	.39	2.17			
WAR	−.29	−.92			
$\sum_{i=0}^{9}$ AYRi	−.04	−1.86			
ρ		.628			
R^2 = .756	SE = .534	D-W = 2.078	df = 106		

* Significantly different from 0 at the .01 level.

findings suggest that it is not political business cycles, but methodological considerations, which explain why the result for the total mortality rate in relation to presidential elections differs from the findings of the Phillips and Feldman (1973) study. Seasonally, mortality reaches its lowest level in August and September and its highest value in January. Unlike the previous case, wars have no significant impact on the mortality rate.

Table 3 shows the slope coefficients, the t-values, and the lag weights between 1910 and 1920 for the suicide rate, and Table 4 shows similar results between 1924 and 1939. The results in the two tables show that when controls are introduced for economic business shifts, presidential elections have no significant impact on the suicide rate. Since it is assumed that the monthly Ayres business index is inversely related to the monthly unemployment rate, the negative signs for the slope coefficients for this variable in Tables 3 and 4 are consistent with the findings in Table 1 and suggest that increased unemployment has a significant impact on the suicide rate. In the period 1924 to 1939 the Ayres business index slope is negative and significant, indicating that unemployment has a significant impact on the suicide rate. By contrast, between 1910 and 1920 the slope coefficient is negative, but it does not have a significant impact on the suicide rate. It may be that the size of the movement of the business cycle in the two time periods causes the different results. Pierce (1967:461) has shown that the absolute value variation in the business cycle, as measured by the first difference of the index of common prices, is significantly related to the annual suicide rate. Comparing the strength of the business cycle 1910 to 1920 and 1924 to 1939, using a monthly common stock index collected by Ayres (1939:192–201), the average value between 1910 and 1920 was approximately one-third of the average value between 1924 and 1939. It may have been the case that between 1910 and 1920 the variation in the unemployment rate was not large enough to have an impact on the suicide rate. Also, unlike Table 1 the results in Table 3 are consistent with Marshall's (1981) findings, in that war has no significant impact on the suicide rate after the effect of unemployment is controlled.

Table 5 indicates the slopes, the t-values and the lag weights for all independent variables in relation to the mortality rate between 1904 and 1937. Similar to the results in Table 2, the presidential elections do not have a significant

deaths in the United States. This anomalous finding may be related to the fact that lagging unemployment by 12 months does not capture the influence of cardiovascular deaths, a major component of the mortality rate. A more refined analysis would have to differentiate further the different components of the mortality rate and determine how variations in the unemployment rate influence them.

Table 4. Slope Coefficients, t-Values, and Time-Lag Weights Relating the Suicide Rate to the Independent Variables between 1924 and 1939

Variables	Slope Coefficient Estimate	t-Values	Time Period for the Unemployment Rate	Slope Coefficient Estimate (Bi)	Weights Wi=Bi/Bn
Constant Term	10.08	45.23*	AYR0	−.0124	0.20
PRS1	−.14	−.40	AYR1	−.0110	0.18
PRS2	−.34	−.97	AYR2	−.0096	0.15
JAN	.13	.78	AYR3	−.0082	0.13
FEB	−.73	−3.43*	AYR4	−.0069	0.11
MAR	1.30	5.47*	AYR5	−.0055	0.09
APR	1.65	6.60*	AYR6	−.0041	0.07
MAY	2.15	8.36*	AYR7	−.0028	0.05
JUN	1.30	5.01*	AYR8	−.0014	0.02
JUL	1.17	4.54*	AYR9	0.00	0.00
AUG	0.65	2.57*			
SEPT	0.46	1.80			
OCT	0.74	3.22*			
NOV	−0.08	−.48			
$\sum_{i=0}^{9}$ AYRi	−.06	−9.57*			
ρ		.630			
R^2 = 0.881	SE = .585	D-W = 2.020	df = 162		

* Significantly different from 0 at the .01 level.

Table 5. Slope Coefficients, t-Values, and Time-Lag Weights Relating the Mortality Rate to the Independent Variables between 1904 and 1937

Variables	Slope Coefficient Estimate	t-Values	Time Period for the Unemployment Rate	Slope Coefficient Estimate (Bi)	Weights Wi=Bi/Bn
Constant Term	85.24	34.11*	AYR0	−.0184	0.15
PRS1	−1.16	−.51	AYR1	−.0168	0.14
PRS2	−.53	−.23	AYR2	−.0153	0.13
JAN	9.72	8.40*	AYR3	−.0137	0.11
FEB	4.10	2.69*	AYR4	−.0122	0.10
MAR	10.38	5.91*	AYR5	−.0107	0.09
APR	1.84	0.97	AYR6	−.0042	0.08
MAY	−2.82	−1.41	AYR7	−.0077	0.07
JUN	−10.72	−5.31*	AYR8	−.0061	0.05
JUL	7.90	−3.96*	AYR9	−.0046	0.04
AUG	−10.07	−5.22*	AYR10	−.0031	0.03
SEP	−12.52	−6.72*	AYR11	−.0015	0.01
OCT	−9.58	−5.83*	AYR12	0.00	0.00
NOV	−9.89	−8.54*			
WAR	2.13	0.48			
$\sum_{i=0}^{9}$ AYRi	.12	−.97			
ρ		0.847			
R^2 = 0.814	SE = 6.345	D-W = 2.148	df = 371		

* Significantly different from 0 at the .01 level.

impact on the mortality rate. Also, as in the previous case, wars do not have a significant impact on this rate. However, unlike the previous results, unemployment, as measured by the Ayres business index, has no significant impact on the mortality rate.

DISCUSSION

This study has produced findings that differ from those in previous studies. In the period 1948 to 1977 there was a negative relationship between unemployment and mortality, while in the period 1904 to 1937 there was no relation-

ship between the two variables. Also, in the period 1948 to 1977 wars (i.e., the Korean War and the Vietnam War) had a significant impact on the suicide rate after the effects of unemployment were controlled. A number of recent statistical studies (Tiao and Wei, 1976; Wei, 1978; Abraham, 1982) have shown that using larger aggregate time units significantly influences the causal relationship. It is likely that the disagreement between the findings in this study and other similar works in the literature are related to the small time units employed in this study. The influence of the size of time units on causal relationships in time-series studies is a question that requires further investigation.

A consistent finding of the present study is that there is no discernible relationship between presidential elections and the mortality and suicide rates. The differences between this finding and the findings of Phillips and Feldman (1973) and Boor (1981) are explained by the different methodology employed in this study and the introduction of controls that eliminated the relationship between presidential elections and the two dependent variables.

In regard to the methodological question, this study developed a time-series model that considered all monthly data in the time period specified and determined whether the suicide and mortality rates in the September and October of presidential election years were appreciably different from other monthly suicide and mortality data after controlling for seasonal effects, war and economic factors, thus considering the full range rather than a subset of the data. It is likely that the differences between the methodology of this study and the previously cited ones influenced the results that were obtained.

Theoretically this study considered the phenomenon of political business cycles and argued that these cycles caused the unemployment rate to be significantly lower during September and October of presidential election years. Just as Marshall (1981) assumed that the effect of war on suicide is mediated by unemployment, this study hypothesized that the relationship between suicide and mortality and presidential elections is mediated by unemployment since the political state managers attempt to manipulate the economy to cause unemployment to reach its lowest level during September and October of presidential election years. With regard to the suicide rate, the hypothesis was validated since the unemployment rate was significantly related to the suicide rate, while the presidential election variables were insignificant. By contrast, no such consistent relationship was observed between the unemployment rate and the mortality rate, indicating that the political manipulation did not influence the mortality rate.

In any case, the findings of this paper discredit the hypothesis that presidential elections influence the suicide or mortality rates. It would be more fruitful for future studies in this area to examine the mechanisms by which economic business cycles influence these rates.

REFERENCES

Abraham, Bovas
1982 "Temporal aggregation and time series." International Statistical Review 50:285–91.

Almon, Shirley
1965 "The distributed lag between capital appropriations and expenditures." Econometrica 33:178–96.

Andress, Vern R. and David M. Carey
1979 "Regional suicide rates as a function of national political change." Psychological Reports 39:955–58.

Ayres, Leonard P.
1939 Turning Points in Business Cycles. New York: Macmillan.

Boor, Myron
1980 "Relationship between unemployment rates and suicide rates in eight countries, 1962–1976." Psychological Reports 47:1095–1101.
1981 "Effects of United States presidential elections on suicide and other causes of death." American Sociological Review 46:616–18.

Brenner, M. Harvey
1971 "Economic changes and heart disease mortality." American Journal of Public Health 61:606–611.
1976 "Estimating the social cost of national economic policy: implications for mental and physical health and criminal aggression." In Achieving the Goals of the Employment Act of 1946. Thirtieth Anniversary Review. Volume 1. Paper No. 5. Washington, D.C.: U.S. Government Printing Office.
1979 "Influence of the social environment on psychopathology: the historic perspective." Pp. 161–77 in James E. Barrett, Robert M. Rose and Gerald L. Klerman (eds.), Stress and Mental Disorder. New York: Raven Press.

Bureau of Labor Statistics
1948–1977 Employment and Earnings. Washington, D.C.: U.S. Government Printing Office.

Downs, Anthony
1957 An Economic Theory of Democracy. New York: Harper & Row.

Durkheim, Emile
[1897] 1951 Suicide. Translated by John A. Spaulding and George Simpson. New York: Free Press.

Granger, Clive W.
1978 "Seasonality: causation, interpretations and implications." Pp. 33–45 in Arnold Zellner (ed.), Seasonal Analysis of Eco-

nomic Time Series. Washington, D.C.: U.S. Department of Commerce, Bureau of the Census.

Gujarati, Damodar
1978 Basic Econometrics. New York: McGraw-Hill.

Hamermesh, Daniel S.
1974 "The economics of Black suicide." Southern Economic Journal 41:188–99.

Hamermesh, Daniel S. and Neal M. Soss
1974 "An economic theory of suicide." Journal of Political Economy 82:83–98.

Henry, Andrew F. and James F. Short, Jr.
1954 Suicide and Homicide. Glencoe, IL: Free Press.

Hibbs, Douglas A., Jr.
1974 "Problems of statistical estimation and causal inference in time-series regression models." Pp. 252–308 in Herbert L. Costner (ed.), Sociological Methodology 1973–1974. San Francisco: Jossey-Bass.
1977 "Political parties and macroeconomic policy." American Political Science Review 71:1467–87.
1979 "The mass public and macro-economic performance: the dynamics of public opinion toward unemployment and inflation." American Journal of Political Science 23:705–31.
1982 "On the demand for economic outcomes: macroeconomic performance and mass political support in the United States, Great Britain and Germany." Journal of Politics 44:426–62.

Land, Kenneth C. and Marcus Felson
1977 "A dynamic macro social indicator model of changes in marriage, family and population in the United States: 1947–1974." Social Science Research 6:328–62.

Land, Kenneth C. and Marilyn M. McMillen
1980 "A macro-dynamic analysis of changes in mortality indexes in the United States, 1946–1975: some preliminary results." Social Indicators Research 7:1–46.

Lester, David
1973 "National homicide and suicide rates as a function of political stability." Psychological Reports 33:298.

Lindbeck, Assar
1976 "Stabilization policy in open economics with endogenous politicians." American Economic Review 66:1–19.

Marshall, James R.
1981 "Political integration and the effects of war on suicide: United States, 1933–76." Social Forces 59:771–85.

Merrill, William C. and Karl A. Fox
1970 Introduction to Economic Statistics. New York: Wiley.

Nordhaus, William D.
1975 "The political business cycle." Review of Economic Studies 42:162–90.

Orcut, Guy H. and David Cochrane
1949 "Application of least squares regression containing autocorrelated error terms." Journal of the American Statistical Association 44:32–61.

Ostrom, Charles W., Jr., and Frances W. Hoole
1978 "Alliances and wars revisited: a research note." International Studies Quarterly 22:215–36.

Phillips, David P. and Kenneth A. Feldman
1973 "A dip in deaths before ceremonial occasions: some new relationships between social integration and mortality." American Sociological Review 38:678–96.

Pierce, Albert
1967 "The economic cycle and the social suicide rate." American Sociological Review 32:457–62.

Pope, Whitney
1976 Durkheim's Suicide. A Classic Analyzed. Chicago: University of Chicago Press.

Schulz, Richard and Max Bazerman
1980 "Ceremonial occasions and mortality: a second look." American Psychologist 35:253–61.

Schumpeter, Joseph A.
1939 Business Cycles. A Theoretical, Historical and Statistical Analysis of the Capitalist Process. New York: McGraw-Hill.

Tiao, George C. and William S. Wei
1976 "Effect of temporal aggregation on the dynamic relationship of two time series variables." Biometrika 63:513–23.

Tufte, Edward R.
1978 Political Control of the Economy. Princeton, NJ: Princeton University Press.

U.S. Bureau of the Census
1903–1936 Mortality Statistics. Washington, D.C.: U.S. Government Printing Office.

U.S. Public Health Service
1937–1977 Vital Statistics of the United States. Washington, D.C.: U.S. Government Printing Office.

Vigderhaus, Gideon
1977 "Forecasting sociological phenomena: application of Box-Jenkins methodology to suicide rates." Pp. 20–51 in Karl L. Schuessler (ed.), Sociological Methodology 1978. San Francisco: Jossey-Bass.

Wei, William W. S.
1978 "Some consequences of temporal aggregation in seasonal time series methods." Pp. 433–44 in Arnold Zellner (ed.), Seasonal Aggregation of Time Series. Washington, D.C.: U.S. Department of Commerce, Bureau of the Census.